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EXAMINER	
KINNEY, ANNA L	

ART UNIT	PAPER NUMBER
1731	

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Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/681,233	Applicant(s) STIGSSON, LARS LENNART	
	Examiner Anna Kinney	Art Unit 1731	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 October 2003*.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-12* is/are rejected.
7)☒ Claim(s) *1-3,8,11 and 12* is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on *09 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The abstract of the disclosure is objected to because it contains the phrase "said" in line 10 of the abstract. Correction is required. See MPEP § 608.01(b).

The disclosure is objected to because of the following informalities: the Examiner has observed several spelling and grammatical errors in the disclosure. For instance, on page 1, line 9, the second occurrence of the word "and" should be "an"; on page 3, line 15, there is an extra space after the word "sulfidity"; on page 4, line 1, the sentence contains the plural "represent" where the singular "represents" is appropriate; on page 4, line 7, the word "borate's" contains an unnecessary apostrophe; on page 8, line 7, the word "liquor" is missing after the words "cellulose spent"; and on page 8, line 16, the sentence contains an extraneous "of" between "substantially" and "updraft". The Examiner recommends that the applicant review the disclosure for further errors.

Appropriate correction is required.

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: Alkali-catalyzed two-stage partial oxidation of low sulfur content spent pulping liquor to recover alkaline liquor with practically zero alkali hydrogen carbonate content.

Claim Objections

Claim 1 is objected to because of the following informalities: the word "components" in line 2 of step (c) of the claim should be "component" to be consistent with the term in step (b) of the claim. In addition, step (d) lacks a comma at the end of the claim, the addition of which would be consistent with the remaining steps of the claim. Appropriate correction is required.

Claims 2, 3, and 11 are objected to because of the following informalities: these claims lack a period at the end of the claim. Appropriate correction is required.

Claim 12 is objected to because of the following informalities: the claim appears to be missing a comma after the word "flashing" in line 3 of the claim. Appropriate correction is required.

Claim 8 is objected to because of the following informalities: the plural form of the word "have" should be replaced by the singular "has". Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the

> art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 4, 5, 7, and 8 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. With respect to claim 4, the discussion of smelt composition on page 11 of the specification does not include disodium borate, potassium analogues, and combinations thereof (lines 24 to 28). With respect to claim 5, the discussion of smelt composition on page 11 of the specification does not include disodium borate, potassium triborate, or combinations thereof. With respect to claim 7, the discussion of black liquor sulfur content on page 14, lines 27 to 28, describes a range sulfur content of lower than 0.3% of the solids. The specification also disusses the sulfidity of "a cooking liquor" lower than 10%. The specification does not clearly indicate that the cooking liquor is intended as spent liquor rather than raw cooking liquor. The range in claim 7 is broader than the range described in the specification on page 14, and the specification does not explicitly define the percentage as weight-based. With respect to claim 8, the discussion of slag or smelt content (page 11, lines 22 to 28) do not mention a sulfide content.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 through 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "said particles" in step (e), line 2 and 4, of the claim. There is insufficient antecedent basis for this limitation in the claim. Previous mention of particles refers to "entrained slag particles" in step (c), and to "entrained alkaline particles" in the first line of step (e). The Examiner suggests that the applicant choose consistent language to clarify that the terms mean the same particles. Claims 2 through 12 are dependent upon claim 1 and are therefore subject to the same rejection.

Claims 4 and 5 are unclear in that they both use the transitional phrase "substantially consists of." The Examiner could not determine what the applicant intended to exclude from this group. See MPEP 2111.03. In addition, the Examiner could not determine whether the applicant intended one or both of the claims to be written in Markush group format. If this was the case, the Markush groups are improper. See MPEP 2173.05(h) I. As written, claim 5 appears to be incomplete. The three compounds recited indicate a single combination, and there are no additional materials recited to make other combinations thereof.

Claim 8 recites the limitation "the smelt" in line 2 of the claim. There is insufficient antecedent basis for this limitation in the claim. Previous mention of the material refer to "molten slag" (claim 1, lines 5-6 of step (a) and line 1 of step (b); claim 8, line 1). The Examiner suggests that the applicant use the term "molten slag" to be consistent with previous recitations.

Claim 11 recites the limitation "raw cooking liquor of b)" at the end of the claim. There is insufficient antecedent basis for this limitation in the claim. Step (b) of claim 1 refers to "an alkaline liquor". The Examiner suggests that the applicant clarify this claim by using the term "the alkaline liquor of b)" to be consistent with claim 1. Claim 12 is dependent upon claim 11 and is therefore subject to the same rejection.

Claim 12 recites the limitation "the alkaline solution" in lines 1 and 2 of the claim. There is insufficient antecedent basis for this limitation in the claim. Both steps (b) and (e) of claim 1 refer to aqueous solutions. The Examiner suggests that the applicant clarify this term by using "the aqueous solution of e)", as recited in claim 11.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 1, 2, 3, 6, and 8 through 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stigsson (WO 00/47812) in view of Backlund et al (U.S. Patent 5,746,886), and further in view of Kohl (U.S. Patent 4,682,985) and Nilsson (U.S. Patent 5,868,805).

With respect to claim 1, Stigsson discloses a two-stage process (page 33, line 34 to page 34, line 2) for the gasification of cellulose spent liquor, which process comprises the steps of: (a) combusting in a first reaction zone of a gas generator (page 36, line 27) a stream comprising an oxygen containing gas and a cellulose spent liquor (page 34, lines 29 to 30) at a pressure of from 0.1 to about 10 MPa (page 34, lines 31 to 32), evolving heat sufficient to raise the temperature in said reaction zone to a first temperature in the range of from 700 C to 1300 C (page 34, line 31), which includes one specific point within the claimed range of from 1000 degree C to 1400 degree C, forming a gaseous component stream and entrained alkali droplets and a liquid alkaline molten slag (page 34, lines 32 to 34), (b) separating said liquid alkaline molten slag from the gaseous component stream (page 36, lines 18 to 23) and dissolving liquid molten slag in an aqueous solution (page 36, line 34 to page 37, line 1), forming an alkaline liquor (page 37, lines 1 to 3), (c) cooling in a substantially vertically arranged second reaction or gas transfer zone of the gas generator said gaseous component stream and entrained slag particles to a second temperature (page 36, lines 27 to 29), (d) further cooling the gaseous component stream by at least one of; i) indirect heat exchange in one or more stages for the generation of fresh steam (page 36, lines 1 to 4), cooling by the direct injection of an aqueous quench liquid into the gaseous component stream (page 35, lines 31 to 34 and page 36, lines 8 to 10) (e) separating entrained alkaline particles from the gaseous component stream and dissolving said particles in an aqueous solution (page 36, lines 31 to page 37, line 1), (f) discharging the gaseous component stream from step e) for use as a gaseous fuel or for use as a synthesis gas (page 37, line 34 to page 38, line 2).

Stigsson does not disclose expressly that this procees is alkali catalysed, nor that the slag comprises at least 75% combined weight of alkali oxide, alkali hydroxide, alkali carbonate, and alkali borates, nor that the alkaline liquor of (b) has an alkali bicarbonate content lower than about 2 grams/liter, nor that the gas and entrained particles in the second reaction zone cool to a temperature below about 1000 C, nor that the gaseous component stream is further cooled to a temperature below about 250 C. However, in the absence of an express disclosure regarding the bicarbonate content, the Examiner assumes that the bicarbonate content is zero, which is within the range of lower than about 2 grams/liter.

Backlund et al discloses an alkali catalysed process (col. 4, lines 60 to 62 and col. 5, lines 9 to 10) for the gasification of cellulose spent liquor (col. 4, lines 32 to 35), which process comprises the steps of: (a) combusting a stream comprising an oxygen containing gas and a cellulose spent liquor (col. 4, lines 32 to 35) at a pressure of 25 bar, which corresponds to 2.5 MPa, which is a point within the claimed range of from 0.1 to about 10 MPa, evolving heat sufficient to raise the temperature in the reactor to a first temperature in the range of from 400 C to 1200 C, which includes one specific point within the claimed range of from 1000 degree C to 1400 degree C, forming a gaseous component stream and entrained alkali droplets and a liquid alkaline molten slag (col. 4, lines 38 to 42) comprising 79.3% alkali carbonate and alkali hydroxide (col. 6, lines 28 to 26, "sodium base" column), which contains one point which falls within the claimed range of at least 75 % combined weight of alkali oxide, alkali hydroxide, alkali carbonate and alkali borates, (b) separating said liquid alkaline molten slag from the gaseous component stream and dissolving liquid molten slag in an aqueous solution (col. 4, lines 44 to 46), forming an alkaline liquor (col. 5, lines 45 to 52).

Backlund et al does not disclose expressly that cooling in a second reaction or gas transfer zone of the gas generator is to a second temperature below about 1000 C, nor that further cooling the gaseous component stream is to a temperature below about 250 C.

Kohl discloses the combustion of cellulose spent liquor occurs in a first reaction zone (Figure 2, item 104) of a gas generator (Figure 2, item 100) (c) cooling in a substantially vertically arranged second reaction or gas transfer zone (Figure 2, item 102) of the gas generator said gaseous components stream and entrained slag particles to a second temperature between about 350 to 850 C, which is below the claimed temperature of about 1000 C (col. 11, lines 6 to 8).

Kohl does not disclose expressly that further cooling the gaseous component stream to a temperature below about 250 C.

Nilsson discloses further cooling the gaseous component stream to a temperature below about 250 C (col. 3, lines 2 to 3).

With respect to claim 2, Stigsson discloses cooling of the gaseous components stream and entrained slag particles in step c) is achieved by the injection of cellulose spent liquor which liquor under endothermic conditions is decomposed to a stream of gaseous components and alkaline slag particles (page 36, lines 27 to 31).

With respect to claim 3, Stigsson discloses that liquid alkaline slag or alkaline slag particles are conveyed by gravity from the second reaction or gas transfer zone counter current to a gaseous component stream, to combine with the alkaline molten slag of step a) (page 36, lines 18 to 24).

With respect to claim 9, Stigsson discloses that the oxygen-containing gas is air, oxygen-enriched air, or oxygen (page 35, lines 4 to 8).

With respect to claim 10, Stigsson discloses that the cellulose spent liquor of step a) is recovered from an alkaline soda pulping process (page 15, lines 4 to 8) with an insignificant quantity of sulfur compounds (page 32, lines 14 to 15), which the Examiner interprets as equivalent to a pulping liquor sulfidity level lower than about 10 %.

With respect to claim 11, Stigsson discloses that the aqueous solution of e) is recycled as raw cooking liquor (page 36, line 34 to page 37, line 3). Although Stigsson does not disclose expressly that this solution is combined with the raw cooking liquor of b), since both streams likely have the same point of reuse, it would have been obvious at the time of the invention to a person skilled in the art to combine the two streams prior to use.

With respect to claim 6, Stigsson does not disclose expressly discloses that the second temperature after cooling in step c) is in the range of 800 C to 1000 C.

Kohl discloses that the second temperature after cooling in step c) is in the range of 350 to 850 C (col. 11, lines 6 to 8), which contains one specific point within the claimed range of 800 C to 1000 C.

With respect to claim 8, Stigsson does not disclose expressly that the molten slag of step a) has a sulfide content corresponding to less than 2 % by weight of the smelt.

Kohl discloses that the molten slag of step a) has a sulfide content of 0.2% by weight, corresponding to the claimed less than 2 % by weight of the smelt (col. 16, line 67).

Stigsson, Backlund, Kohl, and Nilsson are analogous art because they are all from the same field of endeavor, that of recovering pulping chemicals by gasification.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to apply an alkali catalysed process of Backlund et al, with the cooling temperatures Kohl and Nilsson, to the gasification process of Stigsson, and to expect the slag composition of Backlund et al and Kohl from the modified process of Stigsson, to obtain the invention as specified in claims 1 through 3, 6, and 8 through 11.

The motivation for doing so would have been that (a) the catalytic effect makes it possible to operate a suspension bed gasifier at a lower temperature, while retaining the degree of carbon conversion (Backlund et al, col. 5, lines 21 to 26), and the composition is representative of a completely sodium-based system (Backlund et al, col. 5, lines 65 to 66); (b) cooling the gas below about 790 C is cool enough that particles of sodium salts are solid (Kohl, col. 11, lines 10 to 13), and the sulfur reduction efficiency has not been increased by using a divided air feed arrangement (Kohl, col. 17, lines 12 to 17); and (c) cooling the gas to the order of 200 C utilizes the thermal energy in the combustion gases after the gasification (Nilsson, col. 1, lines 13 to 14).

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stigsson, Backlund et al, Kohl, and Nilsson, as applied to claim 1, above, and further in view of Hupa et al ("Fireside behavior of black liquors containing boron", TAPPI Journal, Vol. 1, No. 1, March 2002, pages 48 to 52). The Examiner interpreted each of the claims to indicate one of a group or combination of elements.

With respect to claims 4 and 5, Hupa et al discloses alkali borates present in the molten slag of step a) substantially consist of trisodium borate (page 49, Table 1(B)).

Stigsson, Backlund, Kohl, Nilsson, and Hupa et al are analogous art because they are all from the same field of endeavor, that of recovering pulping chemicals.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to expect the slag composition as in Hupa et al to the chemical recovery process of Stigsson, to obtain the invention as specified in claim 5.

The motivation for doing so would have been that this was the calculated composition of a smelt bed for a liquor containing boron (page 48, col. 3, lines 19 to 21, and page 49, Figure 1 title).

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stigsson, Backlund, Kohl, and Nilsson as applied to claim 1 above, and further in view of Rydholm (Pulping Processes, Sven A. Rydholm, Interscience Publishers, 1967).

With respect to claim 7, Stigsson, Backlund, Kohl, and Nilsson do not disclose expressly that the sulfur content of the cellulose spent liquor in step a) measured as elemental sulfur is lower than 2 % by weight. However, it would have been obvious to a person skilled in the art that if the cellulose spent liquor in step a) comes from a soda process, as disclosed in the specification, the sulfur content of the liquor would be very low. The sulfur content would probably be significantly lower than that of spent liquor from a kraft process, which is 3% (Rydholm, page 777, Table 11.3). Therefore, it would have been obvious that the sulfur content would likely be less than 2%.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stigsson, Backlund, Kohl and Nilsson as applied to claims 1 and 11 above, and further in view of Nilsson (U.S. Patent 5,976,321).

With respect to claim 12, Stigsson, Backlund, Kohl and Nilsson do not disclose expressly that carbon dioxide gas is liberated and removed from the aqueous solution prior to combining with the raw cooking liquor of b), said liberation achieved by thermal treatment of the solution, decompression and flashing or combinations thereof to provide an alkaline solution with an alkali carbonate content lower than about 2 g/liter.

Nilsson ('321) discloses expressly that carbon dioxide gas is liberated and removed from the aqueous solution (col. 13, lines 27 to 32) prior to combining with the raw cooking liquor of b), (col. 11, lines 55 to 58) said liberation achieved by decompression and flashing to provide an alkaline solution. Although Nilsson does not disclose expressly that the alkaline solution has an alkali carbonate content lower than about 2 g/liter, the recovered solution should have a composition very close to that of the original solution of b). Again, without evidence to the contrary, the Examiner assumes that the alkali carbonate content would be zero, which is lower than the claimed about 2 g/liter.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. 6,770,168 shows a gasification process for recovery of pulping chemicals using an oxygen-containing gas, specific temperatures and pressures, and separation of particles from the product gas. U.S. Publication 2005/0098280 A1 (and WO Publication 2004/025020 A1) shows the borate composition in smelt. U.S. 6,500,301 shows an apparatus for gasification of spent liquor. U.S. 5,814,189 shows a method for gasifying cellulose spent liquor. U.S. Patent 6,294,048 shows a catalytic method of recausticizing pulping liquors with specific temperatures. U.S. Patent 5,352,333 shows a process for partial combustion of spent liquor with an oxygen containing gas at specific pressures and temperatures. WO Publication 96/14465 shows a gasification plant for black liquor. U.S. Patent 5,205,908 shows a gasification process with the product gas washed by direct contact with a washing liquid, and melt droplets are put into aqueous solution. U.S. Patent 5,814,189 show a method for gasifying spent liquor to produce steam and low-carbonate green liquor with specific temperatures. Prihoda et al (Paperi Ja Puu – Paper and Timber, vol. 78, No. 8, 1996, pages 456 to 460) shows the effect of borates on recovery of cooking liquors. Cameron et al (Decarbonization of Sodium Carbonate with Sodium Metaborate, TAPPI 2001 Pulping Conference Proceedings) shows the use of sodium metaborate to autocausticize sodium carbonate in to sodium hydroxide.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anna Kinney whose telephone number is (571) 272-8388. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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